

Numerical and Physical Modeling of the Response of Resonator Liners to Intense Sound and High Speed Grazing Flow, Phase II

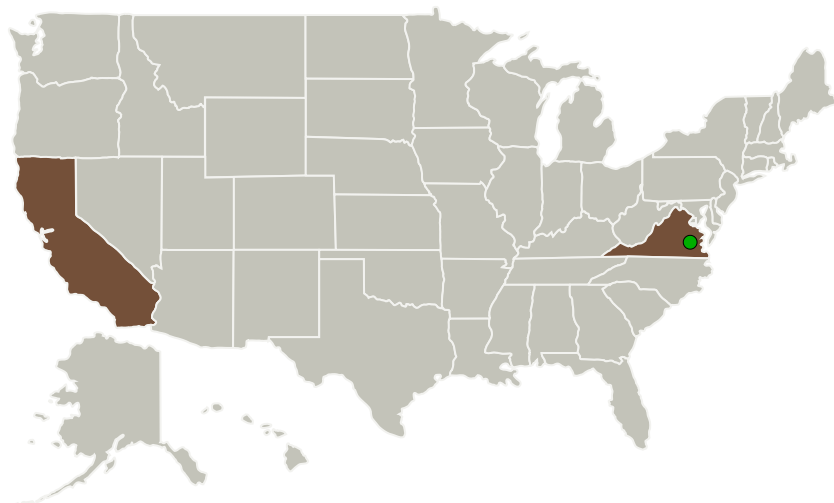
Completed Technology Project (2010 - 2012)



Project Introduction

An aeroacoustic computational code based upon a numerical solution of the full Navier-Stokes equations will be developed to provide a deep understanding of the physical behavior of resonator liners exposed to intense sound and boundary-layer grazing flow. The code computes the entire flow and acoustic field inside the flow duct. The user has the option to choose the flow Mach number, boundary-layer thickness, duct mode of incoming sound, frequency and SPL. For broadband sound, the user has the option to specify an incident noise spectrum. The code is designed to operate at both standard temperatures and very high temperatures. A semi-empirical three-dimensional resonator liner impedance code will be developed for resonators also exposed to intense sound and boundary-layer grazing flow. The liner empirical parameters will be calibrated with NASA furnished resonator test data. Because of its simplicity, it can be used to provide realistic liner geometries for sound propagation codes that are used in both NASA and industry to determine optimum wall impedances to control excessive sound generated in jet engines and other flow duct environments.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Hersh Acoustical Engineering, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Calabasas, California
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

California	Virginia
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Project Transitions

▶ **January 2010:** Project Start

✓ **January 2012:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139305>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Hersh Acoustical Engineering, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

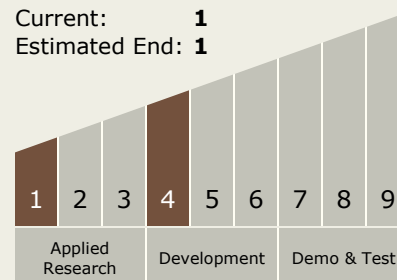
Alan S Hersh

Technology Maturity (TRL)

Start: **4**

Current: **1**

Estimated End: **1**



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Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
 - └ TX09.4 Vehicle Systems
 - └ TX09.4.5 Modeling and Simulation for EDL

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System